1. An interferometry method comprising:

directing a measurement beam to contact a measurement surface and a reference beam to contact a reference surface, wherein the measurement and reference beams are derived from a common source;

imaging light reflected from the measurement surface onto a multi-element detector through an optical system comprising a lenslet array; and

imaging light reflected from the reference surface onto the multi-element detector to interfere with the light reflected from the measurement surface.

2. The method of claim 1, wherein the lenslet array is positioned to generate a virtual image of the measurement surface in a virtual image plane.

3. The method of claim 2, wherein the optical system further comprises a detector imaging system for imaging the virtual image in the virtual image plane onto the detector.

4. The method of claim 3, wherein the optical system further comprises an object imaging system for imaging the measurement surface onto an intermediate image plane adjacent the lenslet array.

5. The method of claim 4, wherein the object imaging system comprises a telecentric relay.

6. The method of claim 4, further comprising combining the light reflected from the measurement surface with the light reflected from the reference surface and directing the combined light towards the lenslet array through the object imaging system.

7. The method of claim 6, wherein the object imaging system images the reference surface onto the intermediate image plane to overlap with the image of the measurement surface.

8. The method of claim 7, wherein the lenslet array is positioned to generate a virtual image of the reference surface in the virtual image plane to overlap with the virtual image of the measurement surface, and wherein the detector imaging system images the overlapping virtual images of the measurement and reference surfaces onto the detector.

9. The method of claim 3, wherein the detector imaging system is selected to demagnify the virtual image onto the detector.

10. The method of claim 4, wherein the magnification of the object imaging system is selected to be greater than the magnification of the detector imaging system.

11. The method of claim 1, wherein the optical system is selected to demagnify the light reflected from the measurement object onto the detector.

12. The method of claim 1, wherein the measurement surface is diffusely reflective.

13. The method of claim 1, wherein the optical system is selected to cause each element of the lenslet array to couple incident light reflected from the measurement object to a different one of the detector elements.

14. The method of claim 1, wherein the lenslet array comprises an array of refractive elements each having focusing power.

15. The method of claim 1, wherein the lenslet array comprises an array of reflective elements each having focusing power.

16. The method of claim 1, wherein the lenslet array comprises an array of diffractive elements each having focusing power.

17. The method of claim 1, further comprising measuring an intensity signal at each of the detector elements and determining a surface profile of a measurement object based on the measured signals.

18. The method of claim 1, wherein the common source is a broadband source and the method further comprises varying an optical path length difference between the measurement and reference surfaces over a range larger than a coherence length defined by the broadband source and measuring an intensity signal at each of the detector elements as a function of the optical path length difference.

19. The method of claim 1, wherein the multi-element detector is a CCD camera.

20. The method of claim 1, further comprising:

directing an input beam from the source into the lenslet array to produce an intermediate beam comprising an array of sub-beams; and

separating the intermediate beam into the measurement and reference beams, wherein the lenslet array is positioned to cause the measurement beam to contact the measurement surface as an array of focused spots corresponding to the array of sub-beams.

21. The method of claim 20, wherein the lenslet array is positioned to generate a virtual image of the measurement surface in a virtual image plane, wherein each element of the lenslet array images a region of the measurement object corresponding to a different one of the array of focused spots.

22. The method of claim 1, wherein the optical system comprising the lenslet array matches an objective numerical aperture with an image numerical aperture.

23. The method of claim 22, wherein the magnification of the optical system is less than 1.

24. An interferometry method comprising:

providing measurement and reference beams derived from a common source;

directing the measurement beam to contact a measurement surface as an array of focused spots and directing the reference beam to contact a reference surface;

imaging light reflected from the measurement surface onto a multi-element detector; and

imaging light reflected from the reference surface onto the multi-element detector to interfere with the light reflected from the measurement surface.

25. The method of claim 24, wherein the measurements surface is diffusely reflecting.

26. The method of claim 24, further comprising:

directing an input beam into a lenslet array to produce an intermediate beam comprising an array of sub-beams; and

separating the intermediate beam into the measurement beam and the reference beam, wherein the lenslet is positioned to cause the measurement beam to contact the measurement surface as the array of focused spots and wherein each of the focused spots corresponds to a different one of the sub-beams.

27. The method of claim 26, further comprising:

imaging the intermediate beam from the lenslet array to a beam splitter positioned to separate the intermediate beam into the measurement and reference beams.

28. The method of claim 27, wherein the intermediate beam is imaged using a telecentric relay.

29. An interferometry system for profiling a measurement surface, the system comprising:

a multi-element detector; and

an interferometer which during operation directs a measurement beam to contact the measurement surface and a reference beam to contact a reference surface, and images light

reflected from the measurement surface to overlap on the multi-element detector with light reflected from the reference surface, wherein the measurement and reference beams are derived from a common light source and wherein the interferometer includes an optical system comprising a lenslet array to image the light reflected from the measurement surface onto the detector.

30. The system of claim 29, wherein the lenslet array is positioned to generate a virtual image of the measurement surface in a virtual image plane.

31. The system of claim 30, wherein the optical system further comprises a detector imaging system for imaging the virtual image in the virtual image plane onto the detector.

32. The system of claim 31, wherein the optical system further comprises an object imaging system for imaging the measurement surface onto an intermediate image plane adjacent the lenslet array.

33. The system of claim 32, wherein the object imaging system comprises a telecentric relay.

34. The system of claim 32, wherein during operation the system combines the light reflected from the measurement surface with the light reflected from the reference surface and directs the combined light towards the lenslet array through the object imaging system.

35. The system of claim 34, wherein the object imaging system images the reference surface onto the intermediate image plane to overlap with the image of the measurement surface.

36. The system of claim 35, wherein the lenslet array is positioned to generate a virtual image of the reference surface in the virtual image plane to overlap with the virtual image of the measurement surface, and wherein the detector imaging system images the overlapping virtual images of the measurement and reference surfaces onto the detector.

37. The system of claim 31, wherein the detector imaging system is selected to demagnify the virtual image onto the detector.

38. The system of claim 32, wherein the magnification of the object imaging system is selected to be greater than the magnification of the detector imaging system.

39. The system of claim 29, wherein the optical system is selected to demagnify the light reflected from the measurement object onto the detector.

40. The system of claim 29, wherein the optical system is selected to cause each element of the lenslet array to couple incident light reflected from the measurement object to a different one of the detector elements.

41. The system of claim 29, wherein the lenslet array comprises an array of refractive elements each having focusing power.

42. The system of claim 29, wherein the lenslet array comprises an array of reflective elements each having focusing power.

43. The system of claim 29, wherein the lenslet array comprises an array of diffractive elements each having focusing power.

44. The system of claim 29, further comprising an analyzer which during operation measures an intensity signal at each of the detector elements and determines a surface profile of a measurement object based on the measured signals.

45. The system of claim 29, further comprising the light source, a positioning system for scanning an optical path length difference between measurement and reference paths over a range larger than a coherence length defined by the light source, and an analyzer which during operation causes the positioning system to vary the optical path difference and

measures an intensity signal at each of the detector elements as a function of the optical path length difference.

46. The system of claim 29, wherein the multi-element detector is a CCD camera.

47. The system of claim 29, wherein the interferometer further comprises a beamsplitter, wherein the lenslet array is positioned to accept an input beam from the light source and produce an intermediate beam comprising an array of sub-beams, wherein the beamsplitter is positioned to separate the intermediate beam into the measurement and reference beams, and wherein the lenslet array is positioned to cause the measurement beam to contact the measurement surface as an array of focused spots corresponding to the array of sub-beams.

48. The system of claim 29, wherein the lenslet array is positioned to generate a virtual image of the measurement surface in a virtual image plane, wherein each element of the lenslet array images a region of the measurement object corresponding to a different one of the array of focused spots.

49. The system of claim 29, wherein the interferometer further includes a mount for securing an measurement object defining the measurement surface.

50. The system of claim 29, further comprising the light source.

51. The system of claim 29, wherein the optical system comprising the lenslet array matches an objective numerical aperture with an image numerical aperture.

52. The system of claim 51, wherein the magnification of the optical system is less than 1.

53. An interferometry system for profiling a measurement surface, the system comprising:

a multi-element detector; and

an interferometer which during operation directs a measurement beam to contact the measurement surface and a reference beam to contact a reference surface, and images light reflected from the measurement surface to overlap on the multi-element detector with light reflected from the reference surface, wherein the measurement and reference beams are derived from a common source and wherein the interferometer includes an optical system comprising a lenslet array to direct the measurement beam to contact the measurement surface as an array of focused spots.

54. The system of claim 53, wherein the interferometer further comprises a beamsplitter, and wherein the lenslet array is positioned to produce an intermediate beam comprising an array of sub-beams, and the beamsplitter is positioned to separate the intermediate beam into the measurement beam and the reference beam, and the measurement beam contacts the measurement surface as the array of focused spots and wherein each of the focused spots corresponds to a different one of the sub-beams.

55. The system of claim 54, wherein the interferometer further comprises a telecentric relay to image the intermediate beam from the lenslet array to the beamsplitter.

56. An interferometric system comprising:

an interferometer configured to receive a light beam from a light source and generate an optical interference pattern; and

a lens system including a numerical aperture converter, the lens system configured to transmit the light beam from the light source to the interferometer and to receive and image the optical interference pattern onto a detector, wherein the numerical aperture converter of the lens system matches an objective numerical aperture of the lens system for illuminating the interferometer to an image numerical aperture of the lens system for imaging the optical interference onto the detector.

57. A method for profiling the surface of an object with an interferometric system, the method comprising:

transmitting a light beam from a light source to an interferometer through a lens system; and

receiving and imaging an optical interference pattern produced by the interferometer onto a detector via the lens system, wherein the lens system includes a numerical aperture converter which matches an objective numerical aperture of the lens system for illuminating the interferometer to an image numerical aperture of the lens system for imaging the optical interference onto the detector.